A rare triple threat: Rat bite fever, endocarditis of ventricular septal defect patch, and multivalve endocarditis with sinus of Valsalva fistula

Meena Nathan, MD, MPH

From the Department of Cardiac Surgery, Boston Children's Hospital, Harvard Medical School, Boston, Mass.

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Address for reprints: Meena Nathan, MD, MPH, Department of Cardiac Surgery, Boston Children's Hospital, 300,

Longwood Ave, Boston, MA 02115 (E-mail: meena.nathan@cardio.chboston.org).

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The case report by Abadeer and colleagues¹ in this issue of the *Journal* is a rare case of rat bite fever resulting in endocarditis. It is unique in having a rare combination of infected ventricular septal defect (VSD) patch, with endocarditis involving the aortic valve, tricuspid valve, and left ventricular outflow tract resulting in a sinus of Valsalva fistula into the right ventricle. Surgical management of this rare entity required extensive debridement and reconstruction of the crux of the heart including the left ventricular outflow tract.

Rat bite fever is rare, described as early as 1899 by Miyake and outlined in great detail in the case report by Blake in 1916.² There have been 22 reported cases with endocarditis since 1915 described by Fenn and colleagues³ in their case report and review in 2014, with a high fatality rate. Endocarditis typically affects diseased valves, and involvement of the aortic, mitral, and tricuspid valves has been described.³ Although more common in adults, cases have been reported in children.^{4,5}

Endocarditis is uncommon in unrepaired VSDs (1.7-2.7/1000 patient years) or pathologic valves (27.1/10,000 patient year for aortic stenosis and 14.5/10,000 patient years for pulmonary stenosis)^{6,7} and even rarer after VSD closure with a reported cumulative incidence of 4% at 40 years after isolated VSD closure.⁸ Several case reports describe aorto-cardiac fistula.⁹⁻¹⁴ Endocarditis of a sinus of Valsalva fistula necessitates extensive debridement and reconstruction because of the involvement of multiple chambers and valves, and associated mortality is higher.^{15,16}

A high index of suspicion is required, as is appropriate testing for identification of the causative organism, because high-dose penicillin therapy is essential for treatment of rat bite fever. Much of the mortality in the earlier series could be attributed to inadequate dosage or inappropriate antibiotic choice.³ Repair ideally should be performed after completion of antibiotics and repeat cultures prove negative; however, altered hemodynamics may require earlier intervention. Although appropriate

Meena Nathan, MD, MPH

Central Message

Streptobacillus moniliformis infection if left untreated leads to fulminant fatal endocarditis, usually of diseased valves. Management includes penicillin and thorough surgical debridement if needed.

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imaging (echocardiography, cardiac magnetic resonance, or computed tomography) guide surgical planning, the ultimate decision on type of repair can be determined only on intraoperative inspection. Aggressive debridement of all infected tissue is key, followed by reconstruction/replacement of the defects resulting from such debridement preferably with biologic material. However, the choice of prosthesis for valve replacement should be based on patient and technical factors.^{17,18} In this case report, Abadeer and colleagues¹ illustrate the extent of the defect in the crux of the heart after meticulous debridement of all endocarditic tissue. They chose to use a mechanical prosthesis for aortic valve replacement and used bovine pericardial patch for reconstruction of left ventricular outflow tract and tricuspid valve, and opted for a bioprosthetic pulmonary valve replacement to minimize the hemodynamic burden of a transannular patch. Decision making on the type of repair and type of prosthesis was based appropriately on intraoperative findings and patient's age.

Thus, a high degree of suspicion is necessary for early diagnosis, management, and prevention of complications in rat bite fever (Figure 1). If endocarditis is present, management should be tailored depending on the extent of endocarditic involvement, with the choice of repair/replacement techniques based on patient and anatomic criteria.

FIGURE 1. Diagnosis and management of rat bite fever and associated endocarditic complications. *PCR*, Polymerase chain reaction.

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